

DOCKET NO.: 270625US0PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: :
KENJI SUZUKI ET AL : EXAMINER: TESKIN, FRED M.
SERIAL NO.: 10/532,244 :
FILED: APRIL 22, 2005 : GROUP ART UNIT: 1796
FOR: CURABLE RESIN COMPOSITION :
AND FLEXOGRAPHIC PLATE
MATERIAL USING THE SAME

REQUEST FOR RECONSIDERATION

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

In response to the Office Action dated November 27, 2007, reconsideration and allowance are respectfully requested in view of the following remarks.

Claims 1 and 3-5 are pending.

Rejection Under 35 U.S.C. §103

The Office Action rejects claims 1 and 3-5 under 35 U.S.C. §103(a) over U.S. Patent No. 5,250,389 to Nakamura et al. ("Nakamura") in view of U.S. Patent No. 4,230,836 to Canterino ("Canterino"), EP 0 013 139 to Arbit ("Arbit") or Weir, "Photolysis of Poly(p-methylstyrene)," J. App. Poly. Sci. 17: 401-419 (1973) ("Weir"). Applicants respectfully traverse the rejection.

Claim 1 recites "[a] cured material, obtained by irradiating a curable resin composition with an active energy ray so that a moiety of a polymer block A contained in the

curable resin composition is crosslinked, the curable resin comprising an addition polymerization-based block copolymer (I), an ethylenic unsaturated compound (II), and a photopolymerization initiator (III), wherein: the addition polymerization-based block copolymer (I) is selected from block copolymers comprising at least one polymer block A and at least one polymer block B, and the hydrogenated products thereof; the polymer block A comprises an aromatic vinyl compound unit containing at least 10% by mass of an alkylstyrene-derived structural unit (a) in which at least one alkyl group having 1 to 8 carbon atoms is bound to a benzene ring; and the polymer block B comprises a conjugated diene compound unit" (emphasis added). Nakamura, Canterino, Arbit and Weir fail to disclose or suggest such a cured product.

Nakamura discloses, in its Examples, a curable resin comprising an addition polymerization-based block copolymer (poly (α -methylstyrene))-polybutadiene-poly (α -methylstyrene) that is irradiated with light to obtain a flexographic printing plate. *See Nakamura*, column 13, lines 46 to 56. As explained in the previous response, because the α -methylstyrene component does not include an alkyl group bound to a benzene ring, as recited in claim 1, crosslinking does not take place upon irradiation. The Office Action asserts that Applicants have not provided objective support for this argument, and thus the argument was given no weight. *See Office Action*, page 5. Applicants address this assertion by providing copies of two articles, *J. Appl. Polym. Sci.*, 134 (1959) and *J. Polymer Sci.*, 3, 2303 (1965) (copies attached), which demonstrate that when poly(α -methylstyrene) is irradiated with an active energy ray, decomposition occurs without crosslinking. Accordingly, Applicants' arguments should be given due weight.

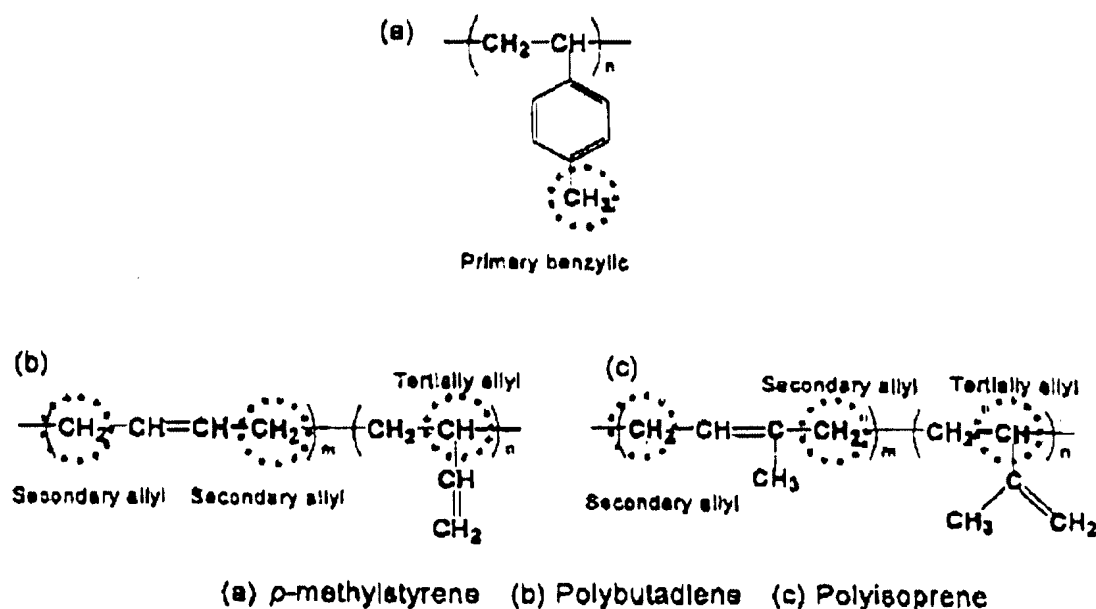
Nakamura is directed to photosensitive elastomer composition including a thermoplastic block copolymer. *See Nakamura*, Abstract. As correctly pointed out in the Office Action, Nakamura includes general disclosure that the block copolymer can include

monovinyl substituted aromatic hydrocarbons, such as "styrene, α -methylstyrene, p-methylstyrene, o-methylstyrene, etc." See Nakamura, column 6, lines 61 to 66. However, the only exemplified monovinyl substituted aromatic hydrocarbon in the Examples of Nakamura is α -methylstyrene. As discussed in the previous response and the paragraph above, because the α -methylstyrene component does not include an alkyl group bound to a benzene ring, as recited in claim 1, crosslinking does not take place upon irradiation. That is, a cured material obtained as recited in claim 1 differs in structure (e.g., due to crosslinking) from a cured material obtained as provided in the Examples of Nakamura.

With respect to the secondary references, Canterino discloses that poly(p-methylstyrene) is crosslinked by UV irradiation. See Canterino, column 5, lines 2 to 4. However, Canterino does not disclose that crosslinking with radiation is carried out in the presence of a photopolymerization initiator and a crosslinking assistant, such as an ethylenically unsaturated compound, as recited in claim 1. Arbit discloses that a blend of poly(p-methylstyrene) and a polyolefin are crosslinked by electron beam irradiation. See Arbit, page 1, lines 3 to 6. However, in Arbit, the crosslinking reaction is not carried out in the presence of a photopolymerization initiator and a crosslinking assistant. Weir discloses that poly(p-methylstyrene) can be crosslinked with light. See Weir, page 401. However, in Weir, a crosslinking reaction is not carried out in the presence of a photopolymerization initiator and a crosslinking assistant. In none of the secondary references is crosslinking of a poly(p-methylstyrene) carried out in the presence of a photopolymerization initiator and a crosslinking assistant. The teachings of the secondary references do not suggest the desirability of employing poly(p-methylstyrene) in the context recited in claim 1.

The Office Action asserts that, based on the disclosure of the secondary references, one of ordinary skill in the art would assume that α -methylstyrene, as employed in the Examples of Nakamura, could be replaced with p-methylstyrene to increase crosslinking. See

Office Action, pages 4 to 5. Applicants have attached hereto a copy of J.A.C.S., 94 1632 (1972), which discloses that an allyl group in a plasticizer such as polybutadiene or in a conjugated diene polymer block in a block copolymer has a higher reactivity than a methyl group bonded to a benzene ring of p-methylstyrene. In particular, Table 6 shows relative rate constants for reactions of various carbon-hydrogen bonds with common radicals and atoms. As shown in Table 6, a reaction velocity of a methyl group with common radicals where the methyl group bonds to a benzene ring of p-methylstyrene (corresponding to "primary benzylic" in the drawing below), is 1/2 to 1/18 of that of an allyl group with common radicals, where the allyl group is present in a plasticizer such as polybutadiene or in a conjugated diene polymer block in a block copolymer (corresponding to "tertiary allyl" or "secondary allyl" as in the drawing below).



Thus, the teachings of the secondary references that poly(p-methylstyrene) can be crosslinked by irradiation does not suggest that the same crosslinking would take place in the presence of a photopolymerization initiator and a crosslinking assistant, as recited in claim 1, because those additional components have a greater reactivity than poly(p-methylstyrene).

Even if a *prima facie* case of obviousness could be made in view of Nakamura, Canterino, Arbit and Weir, such case would be rebutted by the superior results shown in the present specification. Examples 1 to 6 of the present specification are directed to cured materials according to the present invention, which include a p-methylstyrene-containing hard block, which is subjected to crosslinking in the presence of a photopolymerization initiator and/or a crosslinking assistant, while Comparative Examples 1 to 6 are directed to cured materials, which include a styrene-containing hard block, and thus are not crosslinked. *See, e.g.*, present specification, pages 32 to 36. As shown in Tables 1 and 2 of the present specification, the cured materials according to the present invention provide superior performance in tensile strength at break, elongation at break, and reproducing a negative image when used as flexographic plates. These results are objective evidence of the improvements of the cured material of claim 1 over known cured materials, as disclosed in Nakamura, and thus these results rebut any suggestion that it would have been obvious to modify the cured materials of the Nakamura in view of the teachings of the secondary references to obtain the cured material of claim 1.

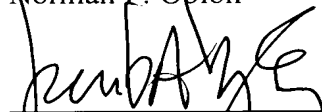
As explained, claim 1 would not have been rendered obvious by Nakamura, Canterino, Arbit and Weir. Claims 3-5 depend from claim 1 and, thus, also would not have been rendered obvious by Nakamura, Canterino, Arbit and Weir. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

For the foregoing reasons, Applicants submit that claims 1 and 3-5 are in condition for allowance. Prompt reconsideration and allowance are respectfully requested.

Respectfully submitted,

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Attachment:

Copies of J. Appl. Polym. Sci., 134 (1959), J. Polymer Sci., 3, 2303 (1965), and
J.A.C.S., 94 1632 (1972)